HOST PLANTS OF THE FRUIT FLIES (DIPTERA: TEPHRITIDAE) OF THE INDIAN SUB-CONTINENT, EXCLUSIVE OF THE SUB-FAMILY DACINAE[1]

MOHAMMAD ZAKA-UR-RAB[2]

In the Indian sub-continent (including India, Pakistan, Sri Lanka, Nepal and Bangladesh), the Tephritidae are represented by 60 genera and 138 species, out of which 56 genera and 102 species belong to sub-families other than the Dacinae. Very little work has been done on the biological aspects of the non-Dacine Tephritidae of the region. This can be gauged from the fact that out of 102 species comprising this group, host plants of only 21 species are known with any degree of certainty.
In the present paper, an attempt has been made to place on record the information hitherto available about the known cultivated as well as wild host plants of the larvae of non-Dacine Tephritidae of the region.

INTRODUCTION

The Tephritidae represent a family of rather conspicuous looking flies whose larvae are entirely phytophagous and show intricate anatomical as well as behavioural adjustments for successfully leading such a mode of life. The only exception perhaps is the Australian tephritid *Rioxa termitoxena* which breeds in the burrows of the tree-dwelling termites, *Mastotermes darwiniensis* and *Calotermes irregularis*, the larvae subsisting on a foul smelling liquid lying within the termite tunnels. Another closely related example is that of *Rioxa modestum* (Fab.) which was recorded by Bezzi (1913) as having been bred from decaying wood at Calcutta in West Bengal.

In the Indian sub-continent, the Tephritidae are represented by 60 genera and 138 species out of which 56 genera and 102 species belong to sub-families other than Decinae.

[1] Accepted August 1980.

[2] Department of Zoology, Aligarh Muslim University, Aligarh, India.

Very little work has been done on the biology of the non-Dacine Tephritidae of the region. This can be gauged from the fact that out of 102 species comprising this group, host plants of only 21 species are known with any degree of certainty. Even where we know something about the host plants of any particular species, it seems that the total range of the latter has not been adequately explored.

Members of the sub-family Trypetinae are mostly fruit feeders although some of them also cause galls or damage seed pods etc. The fruit feeders mostly live on the fleshy portions of wild and cultivated fruits but do not damage their seeds. However, those species which cause galls considerably reduce the vigour of their host plants and can be effectively utilised as biological control agents for combating harmful weeds. Use of *Procecidochares utilis* for controlling the Crofton weed, *Eupatorium adenophorum*, in Hawaii, Australia, New Zealand, India and Nepal, is one such example.

Members of the sub-family Tephritinae, on the other hand, usually infest flower heads of various plants and destroy the seeds develop-

ing therein. While this may amount to serious economic losses in cultivated crops by reducing the seed yields, a large proportion of these species can serve as useful biological control agents for keeping the reproductive potential of noxious weeds under effective check by destroying their seeds.

It is now widely known that a number of plant pests are able to survive and multiply on wild plants which serve as their alternative hosts. For an effective control of such pests it is obviously useful to have as much information as possible about their wild alternative hosts. This is also highly desirable in view of the role played by such wild hosts in the multiplication and augmentation of populations of parasites and predators of various economic pests.

The following text is an attempt to place on record the information hitherto available about the cultivated as well as wild host plants of the larvae of fruit flies (exclusive of subfamily Dacinae) of the Indian sub-continent comprising of India, Pakistan, Sri Lanka, Nepal and Bangladesh.

Sub-family TRYPETINAE

Anoplomus flexosus Bezzi

Cultivated host: *Morus* sp.

(Misra 1920, Kumaon, U.P.; Mathur and Singh 1959).

Wild host: Unknown

Carpomyia vesuviana Costa

Cultivated host: *Zizyphus jujuba* Lam. (= *Z. mauritiana* Lam.)

(Batra 1953; Narayanan and Batra 1960; Pruthi and Batra 1960; Usman and Puttarudraiah 1955; Fletcher 1920, 1917; Khare 1923; Basha 1952).

Wild host: *Zizyphus nummularia* W. and A.

(Batra 1953; Narayanan and Batra 1960; Pruthi and Batra 1960).

Z. vulgaris Lam. (= *Z. sativa* Gaertn., Z. *jujuba* Mill.)

(I reared this fruit fly from infested fruits of *Z. vulgaris* at Srinagar, Sopore, Bandipur and Baramulla in Kashmir where these trees grow wild. This is the first record of *C. vesuviana* from Kashmir, as well as from this host in the Indian sub-continent).

Note: This fruit fly is widely distributed throughout the sub-continent, and is found where-ever *Zizyphus* trees grow.

Ceratitella asiatica Hardy

Cultivated host: Unknown

Wild host: *Loranthus longiflorus* Desv.

(Hardy 1967, at Kahuta, Pakistan, infesting fruits).

Ceratitis capitata (Wied.)

Cultivated host: *Prunus persica* Stokes

(Munro 1938, bred from peach at Pusa, Bihar in 1907 but not subsequently reported).

Wild host: Unknown

Ceratitis sp.

Cultivated host: Unknown

Wild host: *Dendrocalamus giganteus* Munro

(Mathur and Singh 1959, larvae boring in new shoots).

Chaetellipsis paradoxa Bezzi

(= *Poecilis judicauda* Bezzi)

Cultivated host: Unknown

Wild host: *Bambusa burmanica* Gamble

(Bhasin, Roonwal and Singh 1958, breeding in damaged shoots, larva tunnels on outside of node between epidermis and culm sheath).

Chelyophora ceratitina (Bezzi)

(= *Stictaspis ceratitina* Bezzi)

Cultivated host: Unknown

Wild host: *Dendrocalamus strictus* Nees

(Mathur and Singh 1959, infesting shoots).

Bamboos

(Bhasin, Roonwal and Singh 1958, infesting green shoots, larva completely eats out the soft tissue leaving only the culm sheath; Fletcher 1920, at Pusa, Bihar).

Chelyophora striata (Froggatt)

Cultivated host: Unknown

Wild host: *Bambusa vulgaris* Schrad.

(Bhasin, Roonwal and Singh 1956, infesting green shoots).

Dendrocalamus giganteus Munro

D. strictus Nees

(Mathur and Singh 1959, larvae boring in shoots; Fletcher 1920, Sri Lanka, infesting shoots).

Craspedoxantha octopunctata Bezzi

Cultivated host: *Centaurea americana* Nutt.

(Menon, Kapoor and Mahto 1968, Delhi, breeding in flowers).

Wild host: *Gonicaulon glabrum* Cass.

(Senior-White 1922, Nagpur, infesting flowers).

Gastrozona melanista Bezzi

Cultivated host: Unknown

Wild host: *Ficus* sp.

(Usman and Puttarudraiah 1955, Chikmaglur, infesting wild figs).

Myiopardalis pardalina (Bigot)

Cultivated host: *Citrullus vulgaris* Schrad.

Cucurbita maxima Duch.

C. pepo L.

Cucumis melo L.

C. sativus L.

(Janjua 1954; Janjua and Samuel 1941; Pruthi and Batra, 1960; Narayanan and Batra 1960).

Wild host: *Cucumis trigonus* Roxb.

(Misra 1920, at Pusa, Bihar; Janjua 1954; Pruthi and Batra 1960; Narayanan and Batra 1960).

Note: This fruit fly has been recorded from all parts of Pakistan except Sind, and is a very serious pest of cultivated melons particularly in Baluchistan. Reports of its occurrence in various parts of India, however, have been rather few and far between. It appears likely that such chance records were based on infested fruits imported from Pakistan.

Phaeospilodes bambusae Hering

Cultivated host: Unknown

Wild host: Bamboo

(Hering 1940, Coimbatore, bamboo shoots).

Procecidochares utilis Stone

Cultivated host: Unknown

Wild host: *Eupatorium adenophorum* Sprengel

(Kapoor and Malla 1978, at Kathmandu, Nepal, causing gall formation at junction of two leaves or leaf petiole; Kapoor, Malla and Ghosh 1979).

Rhacochlaena cassiae Munro

Cultivated host: *Cassia fistula* L.

(Bhasin, Roonwal and Singh 1958, larvae boring in pods).

Wild host: Unknown

Sub-family TEPHRITINAE

Acanthiophilus helianthi Rossi

Cultivated host: *Carthamus tinctorius* L.

(Bhatia and Singh 1939, Delhi, infesting flowers; Narayanan and Batra 1960).

Centaurea americana Nutt.

(Menon, Kapoor and Mahto 1968, Delhi, infesting flowers; I found it infesting these flowers at Srinagar, Kashmir. This also hap-

pens to be the first report of this fruitfly from Kashmir).

Wild host: Unknown

Isoconia bifaria Munro

Cultivated host: Unknown

Wild host: *Barleria* sp.

(Munro 1947, at Coimbatore, infesting pods).

Stylia sororcula (Wied.)

Cultivated host: *Dahlia* sp. (*D. Pinnata* Cav.?)
Coreopsis drummondi Torr. and Gray
C. grandiflora Hogg

(I bred this fruitfly from the above flowers at Aligarh, U.P.)

Wild host: *Coreopsis* sp.
Bidens sp., and other Compositae.

(Hardy 1964, Nepal, infesting seeds).

Tephritis cardualis Hardy

Cultivated host: Unknown

Wild host: *Carduus edelbergii* (= *C. nutans*)

(Hardy 1974, Swat Distt., N.W.F.P., Pakistan, breeding in flower heads).

Tephritis tribulicola Senior-White

Cultivated host: Unknown

Wild host: Thistle

(Senior-White 1922, Shillong and Mawphlang, Assam).

Trupanea amoena (Frfld.)

Cultivated host: *Tagetes erectus* L.
Chrysanthemum indicus L.

(Trehan 1946, at Lyallpur, Pakistan, infesting flowers).

Wild host: *Veronia cinarea* Less.

(Tehran 1946, at Pusa, Bihar, infesting flowers)

Trupanea stellata Fuessly

Cultivated host: *Calendula officinalis* L.

(Nirula 1942, at Delhi, infesting flowers).

Wild host: Unknown

Host plant — Fruit fly list

Host	*Species*
ACANTHACEAE	
Barleria sp.	*Isoconia bifaria* Munro
BAMBUSEAE	
Bambusa burmanica Gamble	*Chaetellipsis paradoxa* Bezzi
B. vulgaris Schrad.	*Chelyophora striata* (Froggatt)
Bamboo	*Chelyophora ceratitina* (Bezzi)
	Phaeospilodes bambusae Hering
Dendrocalamus giganteus Munro	*Ceratitis* sp.
	Chelyophora striata (Froggatt)
D. strictus Nees	*Chelyophora ceratitina* (Bezzi)
	Chelyophora striata (Froggatt)

COMPOSITAE	
Bidens sp.	*Stylia sororcula* (Wied.)
Calendula officinalis L.	*Trupanea stellata* Fuessly
Carduus edelbergii	*Tephritis cardualis* Hardy
(= *C. nutans* L.)	
Carthamus tinctorius L.	*Acanthiophilus helianthi* Rossi
Centaurea americana Nutt.	—do—
	Craspedoxantha octopunctata Bezzi
Chrysanthemum indicus L.	*Trupanea amoena* (Frfld.)
Corcopsis drummondi Torr. & Gray	*Stylia sororcula* (Wied.)
C. grandiflora Hogg	—do—
Coreopsis sp.	—do—
Dahlia sp. (*D. pinnata* Cav.?)	—do—
Eupatorium adenophorum Sprengel	*Procecidochares utilis* Stone
Gonicaulon glabrum Cass.	*Craspedoxantha octopunctata* Bezzi
Tagetes erectus L.	*Trupanea amoena* (Frfld.)
Veronia cinarea Less.	—do—
CUCURBITAE	
Citrullus vulgaris Schrad.	*Myiopardalis pardalina* (Bigot)
Cucumis melo L.	—do—
C. sativus L.	—do—
C. trigonus Roxb.	—do—
Cucurbita maxima Duch.	—do—
C. pepo L.	—do—
LEGUMINOSEAE	
Cassia fistula L.	*Rhacochlaena cassiae* Munro
LORANTHACEAE	
Loranthus longiflorus Desv.	*Ceratitella asiatica* Hardy
MORACEAE	
Morus sp.	*Anoplomus flexosus* Bezzi
RHAMNACEAE	
Zizyphus jujuba Lam.	*Carpomyia vesuviana* Costa
(= *Z. mauritiana* Lam.)	
Z. nummularia W. & A.	—do—
(= *Z. rotundifolia* Lam.)	
(= *Z. microphylla* Roxb.)	

Z. vulgaris Lam. (= *Z. sativa* Gaertn.) (= *Z. jujuba* Mill.)	*Carpomyia vesuviana* Costa
ROSACEAE	
Prunus persica Stokes	*Ceratitis capitata* (Wied.)
URTICACEAE	
Ficus sp.	*Gastrozona melanista* Bezzi

References

Basha, J. M. G. (1952): Experiments on the control of fruit borers on jujuba. *Indian J. Ent., 14*: 227-238.

Batra, H. N. (1953): Biology and control of fruit-flies in India. *Indian J. agric. Sci., 23*: 87-112.

Bezzi, M. (1913): Indian Trypaneids (fruit-flies) in the collection of the Indian Museum. *Mem. Indian Mus., 3*: 53-175.

Bhasin, G. D., Roonwal, M. L. & Singh, Balwant (1958): A list of insect pests of forest plants in India and the adjacent countries. Part 3. *Indian For. Bull.* (*N. S.*), No. 171: 1-128.

Bhatia, H. L. & Singh, Mohan (1939): *Acanthiophilus helianthi* Rossi a new pest of safflower in Delhi. *Indian J. Ent., 1*: 110.

Fletcher, T. B. (1917): Annotated list of the Indian crop-pests. *Proc. 2nd Ent. Meet., Pusa 18*: 307.

——————— (1920): 2. Annotated list of Indian crop-pests. *Proc. 3rd Ent. Meet., Pusa, 1*: 33-314.

Hardy, D. E. (1964): Diptera from Nepal. The fruit flies (Diptera: Tephritidae). *Bull. Brit. Mus.* (*nat. Hist.*) *Entom, 15*: 145-169.

——————— (1967): Studies of fruitflies associated with mistletoe in Australia and Pakistan with notes and descriptions on genera related to *Perilampsis* Bezzi. *Beitr. Ent., 17*(1/2): 127-149.

——————— (1974): A new *Tephritis* from flower heads of thistle in Pakistan (Diptera: Tephritidae). *Proc. Hawaiian ent. Soc., 21*(3): 373-375.

Hering, E. M. (1940): Eine nueu fruchtfliegen als Bambus schadling (Diptera). *Ann. Mag. nat. Hist., 5*(11): 322-23.

Janjua, N. A. (1954): Biology of the melon-fly *Myiopardalis pardalina* Big. (Riptera. Trypetidae). *Indian J. Ent., 16*: 227-229.

——————— & Samuel, C. K. (1941): Fruit pests of Baluchistan. *ICAR Misc. Bull.*, No. *42*: 1-41.

Kapoor, V. C. & Malla, Y. K. (1978): The infestation of the gall fruit-fly, *Procecidochares utilis* (Stone) on Crofton weed, *Eupatorium adenophorum* Sprengel in Kathmandu. *Indian J. Ent., 40*(3): 337-339.

Khare, J. L. (1923): Ber fruit (*Zizyphus jujuba*) and its fly pest. *Bull. Agric. Res. Inst., Pusa,* No. 143: 1-16.

Mathur, R. N. & Singh, Balwant (1959): A list of insect pests of forest plants in India and the adjacent countries. Part 5. *Indian For. Bull.* (*N.S.*), No. 171(4): 1-165.

Menon, M. G. R., Kapoor, V. C. & Mahto, Y. (1968): *Centaurea americana* as a new host plant record for the fruit flies, *Acanthiophilus helianthi* Rossi and *Craspedoxantha octopunctata* Bezzi in India. *Indian J. Ent., 30*(4): 316.

Misra, C. S. (1920): Index to Indian fruit pests. *Proc. 3rd Ent. Meet. Pusa, 2*: 564-595.

Munro, H. K. (1938): Studies on Indian Trypetidae. *Rec. Indian Mus., 40*: 21-37.

——————— (1947): African Trypetidae. *Mem. Ent. Soc. S. Africa,* No. 1: p. 111.

Narayanan, E. S. & Batra, H. N. (1960): Fruit flies and their control. ICAR, New Delhi: 68 pp.

Nirula, K. K. (1942): *Trypanea stellata* Fuessly. a new pest of some Compositae in India. *Indian J. Ent., 4*: 90.

Pruthi, H. S. & Batra, H. N. (1960): Some important fruit pests of North-West India. *ICAR Bull.*, No. 80: 1-113.

Senior-White, R. (1922): Notes on Indian Trypetidae. *Mem. Dept. Agric.* (*Ent. Ser.*). *7*: 97-98, 156-164.

Trehan, K. N. (1946): Biological observations on *Trypanea amoena* Frfld. *Indian J. Ent., 8*: 107-109.

Usman, S. & Puttarudraiah, M. (1965): A list of the insects of Mysore including mites. *Dept. Agric. Mysore* (*Ent. Ser.*), *Bull. 18*: 1-194.